CESAJ-PD-PN 17 June 2002

Memorandum For Record

Subject: Florida Keys Carrying Capacity Study (FKCCS), Revisions to Delivery Order (DO) 11 Test Model Report based upon National Academy of Science, Other Stakeholders and Government Study Team Review

The following major concerns resulted from the review of the subject Test Model report by NAS, other stakeholder organizations and agencies and the Government Study Team:

Overall

1. Overall, the NAS concludes that the Terrestrial, Fiscal and Scenario Generator modules can be used with minor corrections, while the Human Infrastructure, Socioeconomic and Quality of Life, and Integrated Water module could be used with revision. The Marine Module (diffusion model) should not be used at all.

2. Carrying Capacity Analysis Model (CCAM) vs Carrying Capacity Impact Assessment Model (CCIAM)— The FKCCS goal is "to determine the ability of the Florida Keys ecosystems to withstand all impacts of additional land development activities." The draft CCAM is a good step toward evaluating the impacts of development in the Florida Keys, but it cannot provide quantitative estimates of carrying capacity due to the current lack of scientific knowledge and data. The modules can be used, with revisions, as an impact assessment tool to guide land development activities. **The name of the model has been changed to CCIAM.**

3. Calibration--**The population component of the CCIAM has been calibrated to the U.S. Census 2000 population data. Population and land use change are the principal drivers of the CCIAM.**

4. Model Sensitivities and Uncertainty—**Sensitivity testing of the CCIAM has been performed during development of the CCIAM. The revised report discusses uncertainties associated with each module.**

5. Tourism—NAS and other stakeholders have pointed out the apparent omission of the effects of tourism in the CCIAM. **The CCIAM incorporates tourists as part of the population present in the Keys on any given day, and directly measures their impact on water consumption, demand for non-residential land uses, and government expenditures. Data for other tourism-related parameters, such as boating or diving, are insufficient or inappropriate to establish predictive relationships between land use activities and those parameters. However, direct human impacts on marine**

resources is discussed qualitatively in the revised report, including propeller scarring in seagrasses and boat groundings on coral reefs, snorkeling and diving impacts on coral and recreational fishing.

Scenario Generator

6. Presenting a Context of the Florida Keys—**Revised report presents the context of the Florida Keys, including (a) government has significant control of land uses, (b) tourism and recreation along US 1 are not common for traditional communities, and (c) myriad of rare and endangered plants (including unique tropical hardwood hammock and pine rockland) and animals.**

7. Scenario Description—NAS did not agree with the term Smart Growth scenario. **Scenario was developed and named by the Local Planner Working Group. Revised report will provide complete details of the scenario.**

8. Graphic User Interface—NAS wants the user to be able to set and adjust all carrying capacity thresholds within the interface. **The CCIAM is going to be utilized by decision-makers to determine if and how their Comprehensive Plans should be revised, which may lead to revising Land Development Regulations and policies. Therefore, the carrying capacity thresholds that have been researched and based upon rules and laws (e.g. endangered species recovery plans, hurricane evacuation, potable water permitted) should not be subject to random change by a potentially unknowledgeable user. Thresholds residing within the look up tables of the CCIAM can be changed in the future as new science or knowledge indicate the need.**

9. Vested Development—The NAS stated the remaining number of vested development permitted lots should be incorporated into the CCIAM. **The number of vested development parcels was available during the completion of the Monroe County Comprehensive Plan in the late 1980's and early 1990's. Due to complete turnover of county staff, the number of remaining vested development parcels remaining (those that have not been built) are not retrievable until a building permit is requested for the parcel. Assumptions within a scenario regarding the number of vested development parcels can be input, however, as stated above, the remaining number of vested development of permitted lots is not known and cannot be incorporated into the CCIAM.**

Socioeconomic Model

10. 2000 U.S. Census Data—**2000 U.S. Census data was not available for the November 2001 Draft CCIAM and report. All 2000 U.S. Census data is**

now available and the model has been revised and calibrated using the 2000 U.S. Census data.

11. Use of Independent Population Projections—the November 2001 draft report utilized two population projections. One was based upon the scenario being evaluated, and the other projection provided an independent check of that population. The NAS did not feel the independent population projection was needed or appropriate. **The independent population projection has been deleted from the CCIAM and report. Population is based on the land use specified in the scenario.**

12. Affordable Housing Index (AHI)—The NAS recommended deleting the AHI since it did not change between scenarios. **The AHI is used to describe the current condition only, and has been deleted from the CCIAM for future development scenario evaluations.**

13. Competitive Commerce Index (CCI)—The NAS recommended deleting this CCI since it was not fully explained and its significance was unclear. **The CCI has been deleted from the CCIAM.**

14. Community Character—The community character evaluation was not fully explained in sufficient detail. **Revised report includes a more comprehensive explanation of the use and evaluation of the community character information.**

Fiscal Module

15. Land Acquisition—**The cost of land acquisition has been incorporated into the CCIAM.**

Human Infrastructure Module

16. Land Use Trip Generation Rates—Per the NAS, the ITE Trip Generation Manual, 6th Edition should be used since it is a non-local source. **Monroe County and FDOT use the ITE Trip Generation Manual, 6th Edition, therefore, it is utilized in the CCIAM.**

17. Hurricane Evacuation Model-The NAS recommended that the CCIAM use the recently approved Miller Hurricane Evacuation model within the CCIAM since it addresses evacuation bottlenecks, impacts of low lying areas and alternate storm scenarios. **The Miller Hurricane Evacuation model has been incorporated into the CCIAM.**

Integrated Water Module

18. Calibration of Stormwater Event Mean Concentration (EMC's) and wastewater loads—The NAS wanted the stormwater loads to be based on data from the Keys and calibrated against water quality sampling in the nearshore waters. The NAS also thought that the wastewater loads should be calibrated using actual water quality sampling in the nearshore waters. **There is no data available for the nearshore water quality nor for the stormwater Best Management Practice (BMP) for the Keys specifically. The Florida Keys National Marine Sanctuary (FKNMS) Water Quality Protection Program (WQPP) has been monitoring water quality within the FKNMS since 1993, however, the monitoring stations are not close enough to shore for use in calibration and a nearshore water quality sampling program was not within the scope of the FKCCS. The EMC's used were all from Florida from similar soil types. Wastewater effluent loads developed for Monroe County by the U.S. Environmental Protection Agency, Florida Department of Environmental Protection and Florida Department of Health are used in the CCIAM.**

19. Water Quality—The NAS and other stakeholders expressed concern that pathogens, canal water quality and live aboard boat impacts on water quality are not included in the CCIAM. **Pathogens and live aboard impacts on water quality are important points, however, the data is not available to develop a scientifically valid relationship between these parameters and land development activities within the CCIAM. The information that is available is outlined in the report.**

A Dead End Canal Module will be incorporated into the final CCIAM and FKCCS report that will enable users to understand the differential effects of alternative scenarios on water quality in representative canal segments and the region immediately adjacent to the canal discharge points, relative to current conditions. The development of the scope of this Dead End Canal Module has included discussion and review by U.S. EPA (Bill Kruczynski), FDEP (Gus Rios) and the Monroe County Director of Marine Resources (George Garrett). This coordination with USEPA, FDEP and Monroe County will continue until the completion of the Dead End Canal Module. The revised Test CCIAM report will refer to the development of the Dead End Canal Module and it's incorporation into the final CCIAM and FKCCS report.

20. Event Loadings—The NAS and other stakeholders (SFWMD, USEPA) recommended the use of event loading into nearshore waters, such as from rainfall events. The NAS acknowledges that the loadings will dissipate quickly. **The planning horizon for the FKCCS is 20 years. The CCIAM is a steady state model. Therefore, rainfall events are added and averaged over the planning horizon.**

21. Lime Rock Uptake—The NAS acknowledges the assumption of uptake by lime rock is conservative, but believes more scientific research is needed. USEPA also included a comment to this effect. **The revised report acknowledges additional research is needed to field verify laboratory results and the effect of organic material in effluent. The parameter may be updated if the research indicates the need.**

Marine Module

22. Propeller Scarring, Reef Impacts, Fishing Pressure--The NAS and other stakeholders were concerned that no direct correlation was found between these parameters land development activities and/or tourism impacts. **The current state of data and scientific knowledge limits the ability to develop a relationship between these parameters and land development activities and/or tourism impacts. However, direct human impacts on marine resources is discussed qualitatively in the revised report, including propeller scarring in seagrasses and boat groundings on coral reefs, snorkeling and diving impacts on coral and recreational fishing.**

23. Diffusion Model—The NAS and many other stakeholders were dissatisfied with the simplistic diffusion model used to predict and describe water circulation in and around the study area. The NAS pointed out that the diffusion model does not accurately reflect possible eddies that occur along shorelines and is a very conservative approach (i.e. predicted loads would be greater than what is diffusely input into the marine environment). The NAS does not believe that loads generated should be used to make inferences as to marine water quality. **The marine diffusion module has been "turned off" in the CCIAM. A water circulation model is being developed as part of the Florida Bay and Florida Keys Feasibility Study and can be incorporated into the CCIAM in the future.**

Terrestrial Module

24. Sea Level Rise—The NAS and other stakeholders (Environmental Land Use and Law Center) have pointed out the need to take sea level rise into account for long term planning. **Sea level rise is predicted by U.S. EPA to be on the order of 3 to 4 inches for the 20 year planning horizon for the FKCCS. The resolution of the topographic data available for Monroe County is on the order of 5 feet. Therefore, the CCIAM cannot incorporate the impact of a 3 to 4 inch sea level rise. The revised report acknowledges sea level rise and the potential impact on marine water encroachment on low-lying areas, detectable saltwater intrusion into freshwater lenses, and habitat effects.**

25. Number of Species—**The number of species evaluated by the CCIAM was increased from 7 in the November 2001 model and report to 16 in the**

revised CCIAM and report, including the key deer and lower keys marsh rabbit.

26. Habitat Degradation Decay Coefficients and Index—The NAS points out that the method of determining the coefficients may not be appropriate. **The revised CCIAM and report uses literature citing impact distances from development, the same concept currently used to set the distance of development around eagles nests.**